LISTING OF CLAIMS

Claims 1-32 (canceled).

33. (previously presented) A loading system for loading a molten material into a container, the loading system comprising:

a loading arm extending from a source of the molten material for introducing the material into a container;

a valve for controlling the flow of the liquid material through the loading arm and into the container;

a thermal probe inserted vertically into the molten material and including:

an elongated rod;

a terminal head connected to a proximal end of the elongated rod for manual manipulation of the thermal probe by a user, the terminal head including an edge for removably positioning and resting the terminal head on an edge of an opening in the container retaining the liquid material; and

a plurality of temperature-sensing junctions positioned along the longitudinal length of the rod, wherein each of the plurality of temperature-sensing junctions generates an electrical signal corresponding to the temperature of the molten material contacting the respective junction; and

a programmed processor responsive to the electrical signals from the plurality of temperature-sensing junctions operatively connected to control the flow of molten material through the valve, wherein the programmed processor is programmed to include a shut-off condition when the temperature of the molten material in contact with a first junction is higher

than the temperature of the molten material in contact with at least one junction positioned below the first junction on the rod; and

wherein the shut-off condition includes detecting when the temperature of the molten material in contact with the first junction is greater than a predetermined set temperature.

34. (previously presented) The loading system of claim 33, wherein the molten material is sulfur.

35. (previously presented) The loading system of claim 33, wherein the probe is attached to the loading arm.

36. (previously presented) The loading system of claim 33, wherein each of the plurality of junctions includes a thermocouple.

37. (previously presented) The loading system of claim 33, wherein each of the plurality of junctions includes a transistor.

38. (previously presented) The loading system of claim 33, wherein each of the plurality of junctions includes a resistance temperature detector.

Claims 39-40 (canceled).

41. (previously presented) The loading system of claim 33, wherein the predetermined set temperature is the average of a normal temperature of the molten material and a vapor temperature associated with the molten material.

42. (previously presented) The loading system of claim 33, further comprising:

a display for displaying a measurement value, the processor generating the measurement value corresponding to the level of the molten material in the container as derived from the electrical signals produced by the plurality of junctions.

43. (previously presented) A method controlling the loading liquid material into a container, the method comprising the steps of:

a) producing a probe, said probe including a rod and a plurality of temperature-sensing junctions positioned along the longitudinal length of the rod, wherein each of the plurality of temperature-sensing junctions generates an electrical signal corresponding to the temperature of the liquid material contacting the respective junction;

a1) providing a programmed processor responsive to the electrical signals from the plurality of temperature-sensing junctions operatively connected to control the flow of molten material through a shut-off valve, wherein the programmed processor is programmed to include a shut-off condition when the temperature of the molten material in contact with a first junction is higher than the temperature of the molten material in contact with at least one junction positioned below the first junction on the rod, and wherein the shut-off condition includes detecting when the temperature of the molten material in contact with the first junction is greater than a predetermined set temperature;

b) inserting the probe vertically into the container for the liquid material;

c) removably positioning and resting an edge of a terminal head connected to a proximal end of the elongated rod on an edge of an opening in the container retaining the liquid material, with the terminal head allowing manual manipulation of the probe by a user;

d) admitting the liquid material into the container through a loading arm provided with the shut-off valve controlled by the programmed processor;

e) receiving temperature signals from the probe at the programmed processor;

f) processing the temperature signals at the programmed processor to determine temperature values of the liquid material at each junction of the probe;

g) determining whether the shut-off condition has occurred;

h) continuing to admit the liquid if the shut-off condition has not occurred;

i) repeating steps (e) through (h); and

j) closing the shut-off valve under the control of the programmed processor to stop the liquid flow to the container when the shut-off condition has occurred.

44. (previously presented) The method of claim 43, wherein the liquid material is molten sulfur.

45. (previously presented) The method of claim 43, wherein the predetermined set temperature is the average of a normal liquid temperature of the liquid material and a vapor temperature associated with the liquid material.

46. (canceled).

47. (New) A system for loading molten material into a container having an interior, said system comprising:

a loading pipe which may be coupled to a source of molten material, said loading pipe having an outlet for discharging molten material into the interior of the container through an overhead container opening;

an elongated probe movable from a first position outside of the container into a second position in which at least a first portion of said probe is positioned vertically within the interior of the container; wherein said first portion contains a plurality of vertically spaced temperature sensing devices for producing electrical signals which vary as a function of sensed temperature such that, as molten material is discharged into the interior of the container through said loading pipe, said temperature sensing devices at vertically increased heights come into thermal contact with the molten material;

a processor system located outside of the container and electrically coupled to said sensing devices for receiving said electrical signals; wherein said processor system is programmed to calculate a value representing the current volume or level of molten material within the container based on physical properties of the container in combination with said electrical signals; and

an external device coupled to the processor to provide an indication to a user of the current volume or level of molten material within the container.

48. (New) The system of claim 47, wherein said external device is a visual display.

49. (New) The system of claim 47, further comprising an electrically controlled shutoff valve for controlling the flow of molten material through said loading pipe; wherein said processor system is electrically coupled to said shutoff valve and programmed to close said shutoff valve upon reaching a predetermined volume or level of molten material within the container.

50. (New) The system of claim 47, further comprising an electrically controlled shutoff valve for controlling the flow of molten material through said loading pipe; wherein said processor system is further programmed to monitor said electrical signals and determine whether at least one shutdown condition has occurred; and wherein said processor system is programmed to close said shutoff valve in response to determining that a shutdown condition exists.

51. (New) The system of claim 50, wherein each temperature sensing device is coupled to the said processor system for providing output signals representative of sensed temperature of the respective sensing device; wherein said processor system is programmed to determine the existence of a shutdown condition when the temperature of a temperature sensing device at a first vertical position is higher than the temperature of at least one temperature sensing device at a second vertical position which is lower than said first vertical position, indicating that sulfur solidification may have occurred.

52. (New) The system of claim 47, wherein the container is part of a vehicle, and wherein the loading pipe is selectively moveable from a delivery position in which said outlet is located in the interior of the container and a non-delivery position in which the outlet is located outside of the container.

53. (New) The system of claim 52, wherein said probe is mechanically coupled to said pipe for movement with said loading pipe such that, when said probe is in said first position said loading pipe is in said non-delivery position, and such that, when said probe is in said second position said loading pipe is in said delivery position.

54. (New) The system of claim 47, wherein said temperature sensing devices comprise a lowermost sensing device, an uppermost sensing device, and a plurality of intermediate sensing devices at vertical locations between said lowermost and uppermost sensing devices;

wherein said lowermost sensing device is electrically coupled to said processor system;

wherein said uppermost sensing device is coupled to said processor system;

wherein said lowermost, uppermost, and intermediate sensing devices are serially connected to one another; and

wherein said processor system outputs an operating voltage to one of said lowermost and uppermost sensing devices and receives output signals from the other of said lowermost and uppermost sensing devices, and wherein said processor system determines a value of the current level or volume based upon said output signals.

55. (New) The system of claim 47, wherein the processor system is programmed for loading molten sulfur into an insulated container such that a vapor zone forms over the molten sulfur.

56. (New) The system of claim 49, wherein the processor system is programmed for loading molten sulfur into an insulated container such that a vapor zone forms over the molten sulfur.

57. (New) The system of claim 50, wherein the processor system is programmed for loading molten sulfur into an insulated container such that a vapor zone forms over the molten sulfur.

58. (New) The system of claim 47, further comprising an input device to allow a user to input information concerning the type of container to be filled; wherein said processor system stores physical properties related to a plurality of container types; and wherein said processor system is programmed to receive information entered into said input device and select physical properties relating to the selected container type.

59. (New) The system of claim 47, wherein said probe extends through an overhead opening in the container of at least one predetermined design, and wherein said probe has a structure which, relative to the at least one predetermined design, prevents the probe from falling completely into the molten material.